

# **Documentation of Wildlife Species in Northern Great Plains Network National Parks Using Automated Cameras**

## **Final Report**

By:

**Daniel S. Licht**



**Northern Great Plains Inventory & Monitoring Coordinator  
National Park Service  
Mount Rushmore National Memorial  
Keystone, South Dakota 57751**

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## **EXECUTIVE SUMMARY**

In the summer of 2002, the National Park Service (NPS)—through an agreement with the U.S. Forest Service Rocky Mountain Research Station—initiated a comprehensive mammal inventory at several park units in the Northern Great Plains. Dr. Cheryl Schmidt was the principal investigator on the project. Under her guidance several methods were used to document the presence of mammals including the use of live traps and pitfall traps for small mammals, mist nets and ultra-sonic detectors for bats, and visual observations of mammals and sign. However, early on in the study it was mutually agreed between Dr. Schmidt and Dan Licht of the NPS Northern Great Plains Inventory & Monitoring (I&M) Program that it would be more efficient if the I&M Program conducted the motion-sensing camera portion of the mammal inventory. This document reports the results of that study and is designed to supplement Dr. Schmidt's final report. The motion-sensing cameras were used to document the mid-size nocturnal mammals that would be hard to detect using other methods. Although many mammals were detected using the cameras, all were common species and were expected in the parks. Equipment malfunctions were common. Although the use of motion-sensing cameras may be a useful tool in inventory and monitoring efforts, more reliable equipment is needed.

## **INTRODUCTION AND METHODS**

The Northern Great Plains Inventory & Monitoring (I&M) Network of the National Park Service (NPS) determined that mammal inventories were needed at Agate Fossil Beds, Devils Tower, Jewel Cave, and Scotts Bluff National Monuments (NM), Mount Rushmore National Memorial (NMEM), Fort Laramie, Fort Union Trading Post, and Knife River Indian Villages National Historic Sites (NHS), the Missouri National Recreational River (NRR), and Wind Cave National Park (NP). The Network made this determination based on literature reviews, documented species at the park, scoping workshops, expert opinion, and a comparison of documented species lists to expected species lists.

In fiscal year 2002 the National Park Service (NPS)—through an agreement with the U.S. Forest Service Rocky Mountain Research Station—initiated a comprehensive mammal inventory at several park units in the Northern Great Plains. Dr. Cheryl Schmidt was the principal investigator on the project. Under her guidance several methods were used to document the presence of mammals including the use of live traps and pitfall traps for small mammals, mist nets and ultra-sonic detectors for bats, and visual observations of mammals and sign. The use of motion-sensing cameras was originally within the project scope-of-work. However, due to workload, priorities, and other considerations it was mutually agreed between Dr. Schmidt and Dan Licht of the I&M Program that the I&M Program would conduct the motion-sensing camera portion of the inventory. This report

describes the methods and results of that effort. This report is intended to be a supplement to Dr. Schmidt's more comprehensive final report.

From the summer of 2002 to the summer of 2004 motion-sensing cameras were deployed at Agate Fossil Beds, Devils Tower, Jewel Cave, and Scotts Bluff NM's, Mount Rushmore NMEM, and Fort Laramie, Fort Union Trading Post, and Knife River Indian Villages NHS'. Although the Missouri NRR is included in the comprehensive mammal inventory scope-of-work; it was not visited as part of this study. The decision not to put cameras out at that park was made because: 1) the NPS does not own significant property in the park making protection of the units tenuous, 2) travel costs would be high due to the distance from the I&M Program office in Rapid City to the park, 3) there are likely few species present at the park that required photographic documentation, and, 4) the study results from other parks detected only species common to those parks and it was assumed that similar results would occur at the Missouri NRR.

A variety of cameras were used for the study. All four models (from three different manufacturers) were off-the-shelf products designed for use by hunters for scouting purposes. All models used passive motion-sensing technology. The Highlander Photo Spy was a digital black and white camera that used an infra-red (i.e., invisible) flash. All other units used 35mm film. The Stealth film units had an LED display which recorded the number of times the motion sensor was triggered up to 99 events. The cameras were generally set for a 1-minute delay between images. A list of individual cameras used in the study follows. The numbers before each camera are the ID numbers for the unit.

01 – Highlander Photo Spy.	
02 – Highlander Photo Spy.	Not working. No longer in use.
03 – Highlander Photo Spy.	
04 – Highlander Photo Spy.	
05 – Highlander Photo Spy.	
06 – Highlander Photo Spy.	
07 – Stealth Camera.	
08 – Stealth Camera.	
09 – Stealth Camera.	Water damaged at Mt. Rushmore NMEM.
10 – Game Country Hawk-eye Junior.	
11 – Game Country Hawk-eye Junior.	
12 – Game Country Hawk-eye Junior.	Unit stolen at Fort Laramie NHS.
13 – Game Country Hawk-eye Junior.	Water damaged at Scotts Bluff NM.
14 – Game Country Hawk-eye Junior.	Not working. No longer in use.
15 – Game Country Hawk-eye Junior.	
16 - Stealth Cam MC2-B.	
17 - Stealth Cam MC2-B.	
18 - Stealth Cam MC2-B.	

## RESULTS

The cameras were deployed a total of 2,313 camera nights; however, due to malfunctions they were in operation only 1,628 nights at the most. Several categories were developed for purposes of grouping and interpreting the images. The categories are:

*Unusable* – Used for images when there was simply no way to determine whether an animal was in the image or not. Examples of this include many images that were washed out (i.e., a completely white or ghostly white), most likely due to harsh sunlight shining at the camera lens. Other images were completely or mostly black due to inadequate flash or other problems. In some cases the images from the digital cameras were unusable for reasons which could not be determined, although condensation within the camera housing was suspected of being a problem.

*Empty* – Used if the quality of the image was good but no animals could be identified in the image. Many images fell into this category. In many cases a fast moving animal such as a bird may have triggered the camera, but by the time the shutter activated the animal was out of the field of view. In other cases wind-blown debris or vegetation may have triggered the camera.

*Test/setup* – Used if the image was deliberately or accidentally triggered by an investigator while setting up, maintaining, dismantling, or testing a unit.

*Unknown* – Used for images that definitely captured an animal, but identification of the species or genera could not be determined.

Other categories were species or subject-specific and are self-explanatory. A park-by-park analysis follows.

### Agate Fossil Beds NM

Deployment of motion-sensing cameras was problematic at Agate Fossil Beds NM in large part because of the absence of trees for affixing the cameras and the harsh lighting conditions which often washed-out images making them *unusable*. Many *empty* images were taken by the units in the prairie perhaps due to herbaceous vegetation swaying in the wind and triggering the cameras. The most successful units were deployed in the cottonwood grove in the center of the park. Not surprisingly, these images captured many white-tailed deer. A few *unknown deer* were recorded; these animals are almost certainly white-tails, but the species identification could not be determined from the pictures. The number of camera nights deployed was 520; however, due to known malfunctions the actual maximum number of camera nights for the five stations was 358. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.16. Animals could be discerned in only 31% of the images. Species captured were:

White-tailed deer (36)

Unknown deer (12)

Raccoon (3)

### Devils Tower NM

Devils Tower NM provides ample opportunities for deployment of motion-sensing cameras due to the diversity of habitats. Sites used in this study included a site where deer carcasses were disposed of, a low spot in a mesh fence (i.e., a deer “jump”), and under a bridge along the Belle Fourche River. The number of camera nights deployed was 189; however, due to known malfunctions the actual maximum number of camera nights for the five stations was 114. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.40. Animals could be discerned in only 20% of the images. Species captured were:

White-tailed deer (30)  
Unknown deer (6)  
Striped skunk (3)  
House cat (2)  
Raccoon (1)  
Cottontail rabbit (1)  
Turkey (1)  
Magpie (1)

### Fort Laramie NHS

Fort Laramie NHS provides many quality sites for deployment of motion-sensing cameras including river shorelines and forested riparian areas. Many images were triggered by the domestic horses the park pastures for part of the year. The most successful units were deployed along the river and in the riparian forest. One unit was reported missing by a ranger within a few days of deployment and was likely stolen. The number of camera nights deployed was 282 (excluding the missing unit); however, due to known malfunctions the actual maximum number of camera nights for the seven stations was 186. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.82. Animals could be discerned in only 56% of the images. Species captured were:

White-tailed deer (94)  
Horse (15)  
Canada geese (13)  
Unknown deer (10)  
Raccoon (7)  
Coyote (3)  
Cottontail rabbit (1)  
Turkey (1)

### Fort Union Trading Post NHS

Only one visit was made to Fort Union Trading Post NHS for purposes of deploying cameras and that effort was disappointing due to equipment failures. The number of camera nights deployed was 205; however, due to known malfunctions the actual maximum number of camera nights for the five stations was 123. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.42. Animals could be discerned in only 45% of the images. Species captured were:

White-tailed deer (29)  
Cottontail rabbit (6)  
Ring-necked pheasant (6)  
Unknown deer (5)  
Dog (2)  
Raccoon (1)

### Jewel Cave NM

The results from Jewel Cave NM were disappointing in that very few animals were captured. This may be due in part to the low number of camera nights, the placement of the units, and in part to a comparatively poor habitat, e.g., there is no permanent surface water at the park and ponderosa pine is the predominant habitat. A large number of people were documented by the historic cave entrance; these people were likely park staff or people working on their behalf. It was subsequently determined that the internal clock on the digital cameras was incorrect so all images recorded from the park should be viewed with that potential error in mind. The number of camera nights deployed was 75; there were no known periods of malfunctions. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.20. Animals or people could be discerned in only 35% of the images. Species captured were:

Mule deer (6)  
Turkey (2)  
Cottontail rabbit (1)  
Unknown deer (1)

### Knife River Indian Villages NHS

Only one visit was made to Fort Union Trading Post NHS for purposes of deploying cameras and that effort was disappointing due to equipment failures. A large number of deer were captured which is not surprising given the high densities observed in the park riparian area. The number of camera nights deployed was 215; however, due to known malfunctions the actual maximum number of camera nights for the five stations was 129.

The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.54. Animals could be discerned in only 44% of the images. Species captured were:

White-tailed deer (53)  
Unknown deer (3)  
Red fox (3)  
Ring-necked pheasant (3)  
Raccoon (1)  
Coyote (1)  
Turkey (1)  
Cottontail rabbit (1)  
Dog (1)

#### Mount Rushmore NMEM

Mount Rushmore NMEM had more stations and more camera nights than any other park. This was due to the I&M Program being stationed at the park. In spite of that, the total number of animals captured on film was not that great. This could be due in part to the testing and experimenting that occurred with the equipment, and in part to the poor habitat of the ponderosa pine ecosystem. Of special note is the large numbers of hikers and horseback riders captured by the cameras stationed at trails. The images demonstrate that cameras could be used for monitoring visitor use of the trails. The number of camera nights deployed was 477; however, due to known malfunctions the actual maximum number of camera nights for the eleven stations was 363. The number of animals (including *unknowns*) captured per camera night (excluding periods of known malfunctions) was 0.17. Animals and people (both hikers and horseback riders) could be discerned in only 24% of the images. Species captured were:

Mule deer (40)  
Coyote (8)  
Unknown deer (3)  
Bushy-tailed woodrat (3)  
White-tailed deer (2)  
Raccoon (2)  
Unknown raptor (1)

#### Scotts Bluff NM

A noteworthy result of the camera study at Scotts Bluff NM was the relatively even proportion of white-tailed deer and mule deer captured by the cameras. Every other park showed a clear preponderance of one species or the other. The number of camera nights deployed was 350; however, due to known malfunctions the actual maximum number of camera nights for the ten stations was 280. The number of animals (including *unknowns*)

captured per camera night (excluding periods of known malfunctions) was 0.45. Animals could be discerned in only 39% of the images. Species captured were:

Mule deer (33)  
Raccoon (24)  
White-tailed deer (21)  
Unknown deer (10)  
Beaver (7)  
Coyote (6)  
Cottontail rabbit (5)  
Turkey (2)

## SUMMARY

The use of off-the-shelf motion-sensing cameras for documenting mammal species in the parks was only partially successful. While many mammals and other wildlife species were documented, all were common species that were expected to occur. No rare or unexpected species were captured by the cameras. Hence, the effort contributed little to the overall mammal inventory being conducted for the parks. Many species likely present in the parks such as the mustelids were not captured by the cameras nor any of the other methods employed in the comprehensive mammal inventory.

Another disappointment was that the rate of equipment malfunctions and *unusable* and *empty* images was unacceptably high. Some of this was due to user error (e.g., improper settings); however, many of the malfunctions could not be explained and were likely due simply to technical problems with the equipment. Many of the *unusable* images were due to either too much light or too little. The digital cameras appeared to be especially prone to washed out images due to sunlight shining directly into the lens. Conversely, many of the film images were black. It appears that the manufacturers' estimates of flash range for the film cameras were exaggerated since many dark images occurred even when fast films were used. Many of the *empty* images were likely due to the delay between the motion sensor sensing an image and the camera shutter activating. This delay was confirmed for the digital cameras when tested in the office. It appeared the delay could be as much as 3-4 seconds for those cameras.

An interesting result of the study is that the number of animals captured by the cameras did generally correlate with the perceived density of the principal investigator. For example, the rate of deer captured by the cameras was extremely high at Fort Laramie and Knife River Indian Villages NHS'. This suggests that some type of monitoring system using automated cameras could be used as an index of abundance for common species. The same could be true for monitoring trail use by park visitors.



In spite of the problems experienced with this study the Northern Great Plains I&M Network may want to consider motion-sensing cameras as part of their monitoring program. The cameras require very little time to set up and retrieve, and the work can often be done in conjunction with other projects. The cameras could be used as a crude index of animal or visitor activity. Last, the cameras may continue to increase the park species list. However, should cameras be used for monitoring I recommend digital cameras because of their cost savings over time (i.e., no film or processing costs or scanning time). Digital cameras designed for scientific wildlife studies are just coming on the market. The newer models are advertised as having a faster response time and should (hopefully) be more dependable. Units that stamp the time and date right on the image are recommended because the date and time for the file per se could be modified.

## APPENDIX – Data

### Agate Fossil Beds National Monument

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
AGFO 01	Along mowed driving trail just south of river and west of ranger residence.	N4696837 E602139	6/11/2003 – 7/30/2003	Stealth #17	Herring	Unusable = 28 Test/Setup = 9 Empty = 1	Images washed out. Perhaps from camera looking right into morning sun. Vegetation swaying in front of camera.
			7/30/2003 – 10/18/2003	Stealth #17	Fish Oil Fox lure P. butter	Malfunction	LED read 99 when camera retrieved. Unable to determined malfunction.
AGFO 02	Just southeast of cottonwood grove viewing deer trail.	N4696555 E601331	6/11/2003 – 7/30/2003	Highlander #04	Fox lure	Unusable = 10 White-tailed deer = 3 Unknown deer = 3 Test/Setup = 2 Unknown = 1	
			7/30/2003 – 10/18/2003	Highlander #04	Fish oil	White-tailed deer = 5 Unusable = 3 Unknown deer = 1 Unknown = 1	
AGFO 03	In cottonwood grove pointing down.	N4696628 E601290	6/11/2003 – 7/30/2003	Stealth #16	Herring	Empty = 25 White-tailed deer = 11 Unusable = 2	
			7/30/2003 – 10/18/2003	Stealth #16	Fish oil	Empty = 28 White-tailed deer = 4 Raccoon = 3	
AGFO 04	In cottonwood grove monitoring deer trail.	N4696631 E601274	6/11/2003 – 7/30/2003	Highlander #03	Fish oil Herring	Empty = 13 White-tailed deer = 13 Unknown deer = 8 Unusable = 6 Unknown = 4 Test/Setup = 1	
AGFO 05	Prairie trail southwest of cottonwood grove.	N4696552 E601088	7/30/2003 – 10/18/2003	Highlander #03	Fox lure	Malfunction	Unit not set properly.

## Devils Tower National Monument

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
DETO 01	By fence along river by short term parking area.	N4936673 E0522831	9/23/2003 - 10/24/03	Stealth #17	Mackerel	Malfunction	Battery dead.
			10/24/03 – 11/06/03	Stealth #17	Mackerel	Unusable = 28 Empty = 4 White-tailed deer = 4 Raccoon = 1 Cottontail rabbit = 1	LED read 66 when camera retrieved.
DETO 02	By fence “jump” in southwest corner of park.	N4936291 E0521998	9/23/2003 - 10/24/03	Stealth #16	Mackerel	Empty = 17 Unusable = 11 White-tailed deer = 5 Striped skunk = 2 Turkey = 1 Unknown = 1	LED read 99 when camera retrieved.
			10/24/03 – 11/06/03	Stealth #16	Mackerel	Unusable = 27 Empty = 6 unknown deer = 2 White-tailed deer = 1 Striped skunk = 1	LED read 88 when camera retrieved.
DETO 03	By deer carcass area in southwest corner of park.	N4936234 E0521930	9/23/2003 - 10/24/03	Highlander #03	Mackerel	Empty = 18 White-tailed deer = 16 Test/Setup = 15 Unusable = 7 Unknown deer = 4 Magpie = 1	
			10/24/03 – 11/06/03	Highlander #03	Mackerel	Malfunction	No pictures on card.
DETO 04	Unit by deer exclosure.	N4938053 E0521851	9/23/2003 - 10/24/03	Stealth #18	Mackerel	Malfunction	Camera not set properly.
			10/24/03 – 11/06/03	Stealth #18	Mackerel	Empty = 22 White-tailed deer = 2	LED read 27 when camera retrieved.
DETO 05	Station under bridge over Belle Fourche river.	N4937417 E0523510	10/24/03 – 11/06/03	Stealth #08	Mackerel	Empty = 31 Test/Setup = 2 White-tailed deer = 2 House cat = 2 Unusable = 1	LED read 99 when camera retrieved.

## Fort Laramie National Historic Site

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
FOLA 01	At horse trail at creek.	N4672024 E537366	3/20/03 – 4/23/03	Highlander #04	None	Malfunction	Malfunction
			4/23/03 – 5/20/03	Highlander #04	Mackerel	Horse = 9 White-tailed deer = 9 Empty = 4 Unusable = 3 Unknown = 2 Test/Setup = 1 Coyote = 1 Unknown deer = 1	Lots of horse sign. Defective
FOLA 02	By creek bottom.	N4671985 E537472	3/20/03 – 4/23/03	Game Country #11	Fish oil	Empty = 19 Unusable = 14 Horse = 3 Raccoon = 1	
			4/23/03 – 5/20/03	Game Country #11	Fox lure	Empty = 16 White-tailed deer = 10 Unusable = 3 Horse = 3 Raccoon = 2 Test/Setup = 1 Cottontail rabbit = 1 Coyote = 1 unknown = 1	
FOLA 03	Under bridge over road.	N4672163 E538314	3/20/03 – 4/23/03	Game Country #15	Mackerel	Malfunction	
FOLA 04	Under historic bridge.	N4673222 E538505	3/20/03 – missing	Game Country #12	Fish oil	Malfunction	Reported missing by park a few days after set.
FOLA 05	On deer trail.	N4672023 E536243	3/20/03 – 4/23/03	Highlander #03	Fox lure	White-tailed deer = 52 Empty = 11 Unknown deer = 7 Unusable = 6 Raccoon = 2 Unknown = 2	

						<i>Test/Setup = 1</i> <i>Coyote = 1</i> <i>Turkey = 1</i>	
			4/23/03 – 5/20/03	Highlander #03	Mackerel	<i>White-tailed deer = 17</i> <i>Empty = 8</i> <i>Unusable = 4</i> <i>Unknown deer = 1</i> <i>Unknown = 1</i> <i>Raccoon = 1</i>	
FOLA 06	By river by beaver activity.	N4672274 E536265	3/20/03 – 4/23/03	Stealth #07	Fish oil	<i>Canada geese = 13</i> <i>Empty = 11</i> <i>White-tailed deer = 6</i> <i>Unusable = 5</i> <i>Unknown = 2</i> <i>Raccoon = 1</i> <i>Unknown deer = 1</i>	
FOLA 07	Along river.	N4672200 E538224	4/23/03 – 5/20/03	Game Country #15	Mackerel	Malfunction	Determined that batteries dead.

## **Fort Union Trading Post National Historic Site**

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
<i>FOUS 01</i>	<i>On game trail west of Fort between parking lot and river.</i>	<i>N5316680 E571277</i>	<i>4/13/04 – 5/24/04</i>	<i>Stealth #16</i>	<i>Coon lure</i>	<i>Empty = 23 White-tailed deer = 5 Unknown deer = 4 Unusable = 4 Test/Setup = 2 Ring-necked pheasant = 1</i>	<i>LED read 99 when retrieved.</i>
<i>FOUS 02</i>	<i>Game trail through riparian area west of picnic table near westernmost parking.</i>	<i>N5316731 E571150</i>	<i>4/13/04 – 5/24/04</i>	<i>Stealth #18</i>	<i>Mackerel</i>	<i>White-tailed deer = 22 Empty = 10 Unusable = 3 Unknown deer = 1 Test/Setup = 1 Raccoon = 1</i>	<i>LED read 99 when retrieved.</i>
<i>FOUS 03</i>	<i>Game trail in riparian area.</i>	<i>N5316770 E571103</i>	<i>4/13/04 – 5/24/04</i>	<i>Highlander #04</i>	<i>Not recorded</i>	<i>Malfunction</i>	
<i>FOUS 04</i>	<i>Near west boundary in riparian area.</i>	<i>N5316973 E570880</i>	<i>4/13/04 – 5/24/04</i>	<i>Stealth #17</i>	<i>Mackerel</i>	<i>Malfunction</i>	<i>Dead battery.</i>
<i>FOUS 05</i>	<i>Just west of maintenance shop.</i>	<i>N5316461 E572063</i>	<i>4/13/04 – 5/24/04</i>	<i>Game Country #10</i>	<i>Mackerel</i>	<i>Unusable = 12 Cottontail rabbit = 6 Empty = 5 Ring-necked pheasant = 5 Unknown = 3 Test/Setup = 2 White-tailed deer = 2 Dog = 2 People = 1</i>	

## ***Jewel Cave National Monument***

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
<i>JECA 01</i>	<i>Southwest corner of sewage pond.</i>	<i>N4842230 E0593845</i>	<i>5/21/03 – 6/4/03</i>	<i>Stealth #07</i>	<i>Fish oil</i>	<i>Unusable = 17 Empty = 11 Turkey = 2 Test/Setup = 1 Cottontail rabbit = 1 Unknown deer = 1 Unknown = 1</i>	<i>LED read 39</i>
<i>JECA 02</i>	<i>Under shrub by historic cave entrance.</i>	<i>N4842967 E0593140</i>	<i>5/21/03 – 6/4/03</i>	<i>Highlander #03</i>	<i>No lure</i>	<i>Unusable = 43 People = 36 Empty = 9 Unknown = 4 Test/Setup = 1</i>	<i>Camera had been moved slightly. Times on images subsequently determined to be wrong.</i>
<i>JECA 03</i>	<i>In Hell Canyon south of highway.</i>	<i>N4843262 E0592882</i>	<i>5/21/03 – 6/4/03</i>	<i>Game Country #11</i>	<i>Fish oil Fox lure</i>	<i>Test/Setup = 2 Unusable = 2 Empty = 1</i>	
<i>JECA 04</i>	<i>At Hell Canyon culvert under highway.</i>	<i>N4843335 E0592906</i>	<i>5/21/03 – 6/4/03</i>	<i>Highlander #04</i>	<i>Fish oil</i>	<i>Empty = 3 Test/Setup = 2 People = 2 Unusable = 1 Mule deer = 1</i>	
<i>JECA 05</i>	<i>Lithograph Trail road</i>	<i>N4842701 E0594999</i>	<i>5/21/03 – 6/4/03</i>	<i>Highland #05</i>	<i>Fish oil</i>	<i>Mule deer = 5 Test/Setup = 1</i>	

## ***Knife River Indian Villages National Historic Site***

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
<i>KNRI 01</i>	<i>Game trail in north half of park.</i>	<i>N5248350 E319996</i>	<i>4/14/04 – 5/27/04</i>	<i>Highlander #01</i>	<i>Fish oil</i>	<i>Malfunction</i>	
<i>KNRI 02</i>	<i>Vehicle trail in north half of park.</i>	<i>N5248757 E320001</i>	<i>4/14/04 – 5/27/04</i>	<i>Highlander #05</i>	<i>Mackerel</i>	<i>Malfunction</i>	
<i>KNRI 03</i>	<i>Set by bench turn-around overlooking river in north half of park.</i>	<i>N5249980 E319707</i>	<i>4/14/04 – 5/27/04</i>	<i>Game Country #11</i>	<i>Mackerel</i>	<i>Empty = 14 Unusable = 12 White-tailed deer = 6 Test/Setup = 2 Turkey = 1 Coyote = 1 Cottontail rabbit = 1</i>	
<i>KNRI 04</i>	<i>Tree by mowed vehicle trail in south half of park.</i>	<i>N5245104 E320681</i>	<i>4/14/04 – 5/27/04</i>	<i>Stealth #08</i>	<i>Mackerel</i>	<i>White-tailed deer = 25 Empty = 10 Test = 1 Unusable = 1 Unknown deer = 1 Vehicle = 1</i>	<i>LED read 99 when retrieved.</i>
<i>KNRI 05</i>	<i>On mowed vehicle trail leading to Knife River in center of park.</i>	<i>N5247313 E320152</i>	<i>4/14/04 – 5/27/04</i>	<i>Highlander #03</i>	<i>Mackerel</i>	<i>Empty = 24 White-tailed deer = 22 Unusable = 20 Test/Setup = 3 Red fox = 3 Ring-necked pheasant = 3 Unknown = 3 Unknown deer = 2 Raccoon = 1 Dog = 1</i>	



## Mount Rushmore National Memorial

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
MORU 01	On old hiking trail north of well near north boundary.	N4860444 E624362	8/23/03 – 8/30/03	Highlander #??	No lure	People = 7 Mule deer = 5 Empty = 3 Test/Setup = 2	
			8/30/03 – 9/5/02	Highlander #??	No lure	Empty = 4 People = 4 Test/Setup = 1	
			9/5/02 – 9/10/02	Highlander #??	Fish oil	People = 5 Unusable = 2 Empty = 1	
			9/10/02 – 10/4/02	Highlander #??	Fish oil Fox lure	Empty = 6 People = 4 Coyote = 3 Mule deer = 2 Test/Setup = 1 Unusable = 1 Unknown = 1	
			10/1/03 – 11/18/03	Highlander #??	Mackerel	Test/Setup = 5 People = 3 Empty = 2	
MORU 02	20 yards off trail camera #1 is on	N4860515 E623942	8/23/02 – 9/5/02	Stealth #??	Fish oil	Empty = 22 Unusable = 8 Test/Setup = 2 Mule deer = 2 Unknown = 1	LED read 97
			9/5/02 – 9/10/02	Stealth #??	Peanut butter	Empty = 35	LED read 39
			10/6/03 – 10/24/03	Game Country #10	Mackerel	Malfunction	
MORU 03	In beaver pond in Starling Basin.	N4858456 E0623711	8/27/02 – 9/5/02	Stealth #??	Fish oil	Empty = 24 Unusable = 8 Test/Setup = 1 Horse rider = 1	LED read 94

			9/5/02 – 9/10/02	Stealth #??	Peanut butter	Empty = 26 Unusable = 4 Horse rider = 4 People = 4 Test/Setup = 2	LED read 64
MORU 04	Along Blackberry Trail.	N4858764 E0623871	8/25/02 – 8/27/02	Highlander #??	No lure	Empty = 9 Horse rider = 3	
			8/27/02 – 8/30/02	Highlander #??	No lure	Empty = 11 People = 4 Horse rider = 2 Test/Setup = 2	
MORU 05	At culvert on east boundary.	N4859200 E0624899	8/25/02 – 9/5/02	Stealth #??	Fish oil	Unusable = 6 Empty = 3 Test/Setup = 2	LED read 27
			9/5/02 – 9/10/02	Stealth #??	Peanut butter	Empty = 12 Unusable = 12 Test/Setup = 2 Mule Deer = 2	LED read 38
			9/10/02 – 10/04/02	Stealth #??	Coon lure	Empty = 25 Test/Setup = 2 Unusable = 1 Coyote = 1 Unknown deer = 1	LED read 59
MORU 06	Trail crossing at park well facility	N4860059 E0624383	8/25/02 – 8/30/02	Highlander #??	Fish oil	Mule deer = 5 Empty = 3 Test/Setup = 1	Batteries appeared dead
			8/30/02 – 9/5/02	Highlander #??	Not recorded	Test/Setup = 1 Mule deer = 1	
			9/5/02 – 9/10/02	Highlander #??	Peanut butter	Test/Setup = 2 Empty = 1	
			9/10/02 – 10/4/02	Highlander #??	Fish oil on 9/10 Fox lure on 9/20	Mule deer = 17 Empty = 13 Test/Setup = 2 Unknown deer = 1 Unknown = 1	

			1/3/03 – 1/27/03	Highlander #??	Fox lure on 1/3 Bacon grease on 1/27	Empty = 7 Test/Setup = 3 Unknown deer = 1	
			10/1/03 – 11/5/03	Highlander #??	Mackerel	Test/Setup = 5 Empty = 4 White-tailed deer = 2 Unusable = 1 Coyote = 1	
MORU 07	Blackberry Trail	N4858690 E623769	8/30/02 – 9/10/02	Highlander #??	No lure	People = 18 Empty = 13 Unusable = 6 Horse rider = 5 Test/Setup = 2 Mule deer = 1	
			9/10/02 – 9/20/02	Highlander #04	No lure	Empty = 26 Horse rider = 13 People = 8 Mule deer = 3 Test/Setup = 2	
MORU 08	Creek to Lafferty Gulch	N4860068 E624653	9/10/02 – 9/20/02	Stealth #??	Fish oil	Empty = 16 Unusable = 12 Test/Setup = 5 Mule deer = 2 Coyote = 1 Raccoon = 1	LED read 33
			9/20/02 – 10/04/02	Stealth #??	Coon lure	Malfunction	No LED display. Low battery.
			11/18/02 – 11/25/02	Game Country #??	Fish oil	Empty = 4 Test/Setup = 2 Unusable = 1 Raccoon = 1	LED read 31 (was originally at 26)
			12/11/02 – 12/18/02	Game Country #??	Mackerel	Malfunction	Camera was previously used when put out with LED reading 31 pictures.
			12/18/02 – 12/24/02	Game Country #??	Mackerel	Malfunction	LED read 32 (was originally at 31). Batteries appeared

							<i>dead.</i>
			<i>1/3/03 – 1/27/03</i>	<i>Highlander #??</i>	<i>Mackerel</i>	<i>Malfunction</i>	
			<i>1/27/03 – 2/19/03</i>	<i>Highlander #??</i>	<i>Bacon grease</i>	<i>Malfunction</i>	
			<i>10/6/03 – 10/24/03</i>	<i>Game Country #??</i>	<i>Mackerel</i>	<i>Empty = 33</i>	<i>Images only from 10/6-10/8</i>
			<i>10/24/03 – 11/5/03</i>	<i>Game Country #??</i>	<i>Mackerel</i>	<i>Malfunction</i>	<i>Could not find developed film yet notes indicate full roll taken.</i>
<i>MORU 09</i>	<i>Station along game trail. Near large squirrel midden</i>	<i>N4858848 E0623912</i>	<i>9/20/02 – 10/4/02</i>	<i>Highlander #??</i>	<i>Coon lure</i>	<i>Test/Setup = 3 Mule deer = 2 Empty = 1</i>	
<i>MORU 10</i>	<i>At beaver pond in Starling Basin.</i>	<i>N4858451 E623703</i>	<i>9/10/02 – 9/20/02</i>	<i>Stealth #09</i>	<i>Fish oil</i>	<i>Empty = 22</i>	<i>Camera 1/3 submerged by rising water</i>
<i>MORU 11</i>	<i>Pflaum flats south of highway.</i>	<i>N4858988 E624260</i>	<i>9/8/03 – 9/24/03</i>	<i>Highlander #??</i>	<i>Deer carcass</i>	<i>Test/Setup = 4 Empty = 3 Woodrat = 3 Unusable = 2 Coyote = 2 Unknown raptor = 1</i>	

## Scotts Bluff National Monument

Name	Location	UTMs	Dates	Camera	Lure	Images	Comments
SCBL 01	At large culvert under train track	N4634173 E0607909	10/9/02 – 11/4/02	Stealth #??	No lure	Empty = 33 Test/Setup = 1	No display on LED. Batteries appeared dead
SCBL 02	Tied to wooden fencepost by train track at game crossing between fence and butte	N4634148 E0607994	10/9/02 – 11/4/02	Game Country #??	No lure	Empty = 17 Cottontail rabbit = 5 Unusable = 2 Unknown deer = 1	LED read 92
SCBL 03	Big cottonwood by rock dam at west end of island.	N4634535 E0607461	10/9/02 – 11/4/02	Unknown film camera	Fish oil	Raccoon = 11 Empty = 6 Unusable = 6 Unknown = 3 White-tailed deer = 2	LED flickering
SCBL 04	On island. Ash by river along game trail paralleling river.	N4634120 E0608693	10/9/02 – 11/4/02	Highlander #??	Fox lure	White-tailed deer = 16 Mule deer = 8 Empty = 7 Unknown deer = 3 Unknown = 2 Test/Setup = 1	
			3/20/03 – 4/24/03	Highlander #05	Fish oil	Malfunction	Malfunction
SCBL 05	On island. Box elder by river bank.	N4634123 E0608762	10/9/02 – 11/4/02	Stealth #??	Fish oil	Empty = 36 Raccoon = 1	LED read 56
SCBL 06	Small box elder across canal over metal walk bridge/control structure.	N4634033 E0608830	10/9/02 – 10/11/02	Game Country #13	Not recorded	Malfunction	Moved to SCBL 09 (see below)
SCBL 07	Just SW of east entrance in draw.	N4630954 E0608158	10/11/02 – 11/4/02	Highlander #??	Fox lure	Mule deer = 17 Test/Setup = 8 Coyote = 6 Empty = 6 Unknown deer = 4 Unknown = 1	
			3/20/03 – 4/24/03	Highlander #02	Fox lure	Empty = 3 Unusable = 3	

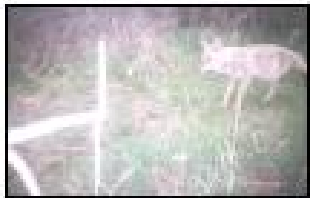
						<i>Test/Setup = 1</i>	
<i>SCBL 08</i>	<i>Chained to same tree as set 6.</i>	<i>N4634033 E0608830</i>	<i>10/11/02 – 11/4/02</i>	<i>Highlander #??</i>	<i>Fish oil</i>	<i>Empty = 17 Mule deer = 7 Test/Setup = 4 Unknown deer = 2 White-tailed deer = 2 Raccoon = 1 Unknown = 1</i>	
			<i>3/20/03 – 4/24/03</i>	<i>Highlander #06</i>	<i>Not recorded</i>	<i>Empty = 10 Unusable = 2 Unknown = 2 Turkey = 2 Raccoon = 1 White-tailed deer = 1 Mule deer = 1</i>	
<i>SCBL 09</i>	<i>Tied to wood post (no lock) at south end of metal walkway near station 8.</i>	<i>N4634046 E0608836</i>	<i>10/11/02 – missing</i>	<i>Game Country #13</i>	<i>Coon lure Fish oil</i>	<i>Malfunction</i>	<i>Subsequently found in brush pile</i>
			<i>3/20/03 – 4/24/03</i>	<i>Unknown film camera</i>	<i>Fish oil</i>	<i>Malfunction</i>	<i>LED read 1</i>
<i>SCBL 10</i>	<i>By canal by beaver area.</i>	<i>N4634040 E608822</i>	<i>3/20/03 – 4/24/03</i>	<i>Highlander #01</i>	<i>Fish oil</i>	<i>Unusable = 21 Test/Setup = 9 Unknown = 9 Beaver = 7 Raccoon = 7 Empty = 5</i>	<i>Moisture in unit</i>

## APPENDIX – Sample Photos

Sample Images



## Sample Images





## APPENDIX – Field Notes

### AGFO Camera Stations

1. On mowed trail by Niobrara. Stealth unit 17. Attached to fence post but not locked. N4696837 E602139. Set at 11:31 on 6/11/2003. Kodak Elite 400sp 36exp. Eveready Energizer batteries. Default settings. Herring bait in small dirt hole. Took digital images of set. Took test picture. Drove by about 1-2 hours later so likely triggered camera then. On 7/30/2003 at 3:40pm put new film (Elite 400sp 36exp) and batteries (Eveready Energizer) in. LED had read 99. Put out fish lure, fox lure, and peanut butter. Moved vegetation away from front of camera. Pulled on 10/18/2003 in mid afternoon. Believe LED read 99.

2. On deer trail. N4696555 E601331. Digital unit 04. Attached to fence post with no lock. 32mb card. Previously used Energizer batteries. Facing downhill and down trail at 339 degrees. Normal temperature setting. Set at 12:10 on 6/11/2003. Placed Rickards fox lure on trail. On 7/30/2003 around midday put new 32mb card in. Left batteries in. Put fish lure on trail. No tracks were observed on trail. Pulled on 10/18/2003 in mid afternoon.

3. In cottonwood grove attached to tree pointing down at sharp angle. N4696628 E601290. No lock. Stealth Unit 16. Default settings. Eveready Energizer batteries. Herring bait under log. Kodak Elite 400sp 36exp film. Set shortly after noon on 6/11/2003. On 7/30/2003 at 2:30pm replaced film with Elite 400sp 36exp and batteries with new Eveready Energizer. LED had read 99. Put fish lure near logs. Pulled on 10/18/2003 in mid afternoon.

4. In cottonwood grove attached to large cottonwood. N4696631 E601274. Attached to tree but not locked. Normal temperature setting. Fish lure and herring bait in hole in log. Digital unit 03. 32mb card. Previously used Energizer batteries. Set shortly after noon on 6/11/2003. Pulled on 7/30/2003 around 2:00pm. Vegetation was about 4-5ft high and obscuring bait site.

5. Camera Station 05 set along mowed trail south and west of cottonwood groves (within 100 yards of fence line). N4696552 E601088. Used digital camera Unit 03 from floodplain. New Eveready Energizer batteries and 32mb card. Temperature set to Hot. Set on 7/30/2003 at 3:10pm. Connected to fence post. Used fox lure and small dirt hole set at base of yucca. Pulled on 10/18/2003 in mid afternoon. Unit was not set properly - no pictures on card.

### DETO Camera Stations

1. By fence along river by short term parking are. UTM N4936673 E0522831. Stealth camera Unit 17. Set on 9/23/2003. Used Mackerel bait in dirt hole. New Rayovac batteries. Was dead at 9:45am on 10/24/03. Film was advanced but not rewound (accidentally exposed film). Bait was gone. Replaced batteries with new Energizers and put out Mackerel. Left film in. Setting of 30 minutes between pictures. Took test picture. Pulled on 11/06/03 by Marcia Wilson. LED read 66.

2. By fence jump. UTM N4936291 E0521998. Stealth Unit 16. Set on 9/23/2003. New Rayovac batteries. Used Mackerel bait in dirt hole. On 10/24/2003 at 10:35am LED read 99. Put in new Elite 400sp 36exp film. Low battery LED started blinking after new film put in so put in new Rayovac batteries. Bait all gone so put out new Mackerel bait. Pulled on 11/06/03 by Marcia Wilson. LED read 88.

3. By deer carcass area. UTM N4936234 E0521930. Digital camera Unit 03. New batteries. On 10/24/2003 replaced card. Put Mackerel bait in carcass. Pulled on 11/06/03 by Marcia Wilson. No pictures on digital card.

4. Unit by enclosure. UTM N4938053 E0521851. Stealth Unit 18. Set on 9/23/2003. New batteries.

Checked on 10/24/2003. Appeared to malfunction - camera was set at TEST. Moved to ON. Baited with Mackerel. Left as is. Pulled on 11/06/03 by Marcia Wilson. LED blinking and reads 27.

5. Station under bridge alongside Belle Fourche river. UTM N4937417 E0523510. Set on 10/24/2003. Stealth Unit 08. Camera already had film in which was partially exposed. Baited with Mackerel. New batteries - 4 Rayovac and 4 Energizers. Used fence post and tape. Lots of deer and other tracks in mud. Pulled on 11/06/03 by Marcia Wilson. LED read 99. Low battery light blinking.

#### FOLA Camera Stations

1. At horse trail at creek. N4672024 E537366. Set at 10:55am on 3/20/03. No bait. Digital Camera Unit 04. Put in new Energizer D batteries. Delay set for 1 minute. 32mb card. Temp setting normal. Clock set to month-day-year. Put out mackerel on 4/23/03. Changed 32mb card at 16:46. (Subsequently discovered that no pictures were on card.) Closed at 9:45 on 5/20/03. Took test picture. Lots of horse sign in area and on trail.

2. Game Country Camera Unit 11. N4671985 E537472. Fish lure. By creek bottom. Set on 3/20/03 at about 11:20. No lock. Put in Ektachrome 400 36 exp. Put in 2 charged AA Energizer NiMH batteries and 4 new C Energizer batteries. Dip switches set for 3 minutes between pictures and 24 hours. Checked on 4/23/03 at 16:55. LED read 0. Sensor red light was working. All settings good. Film rewound. Put in new 36exp Elite 400. Fox lure. Replaced AA batteries camera (with alkaline type, brand not recorded). Took 2 test pictures. Closed at 10:00 on 5/20/03. LED read 0. Trail well used.

3. Set on 3/20/03. N4672163 E538314. Game Country Camera Unit 15. Put in Ektachrome 400 36exp. Put in 2 charged AA Powerex NiMH batteries and 4 new C Energizer batteries. Dip switches set for 3 minutes between pictures and 24 hours. First picture accidentally taken. Mackerel bait. Under bridge over road. No lock. Connected to fence post. Pulled on 4/23/03 at 14:56. LED read 9. Low battery blinking.

4. Set on 3/20/03. N4673222 E538505. Game Country Camera Unit 12. Put in Ektachrome 400 36exp. Put in 2 charged AA Energizer NiMH batteries and 4 new C Energizer batteries. Dip switches set for 3 minutes between pictures and 24 hours. Fish lure. Under historic bridge. No lock. Connected to fence post. Reported missing by Tammy Benson a few days later.

5. Digital Camera Unit 03. N4672023 E536243. Put in new Energizer D batteries. Delay set for 1 minute. 32mb card. Temp setting normal. Clock set to month-day-year. Fox lure. On deer trail. Checked on 4/23/03 at 14:34. Took test picture but did not show up on card. Put 32mb card back out. Kept same batteries in. Put out mackerel. Closed on 5/20/03 at 09:27. Took test picture. Unit dry inside.

6. Set on 3/20/03 about 1500 (check other sites for precise time - about 15 minutes later than site 5). By river by beaver activity. N4672274 E536265. Fish lure. Stealth Camera Unit 07. Put in Ektachrome 400 36exp. Put in 4 new Energizer C batteries. Delay for 1 minute. Continuous pictures set at 1. Clock set to year-month-day. Fence post. No lock. Closed on 4/23/03 at 13:52. Low battery light blinking. LED read 99.

7. Set at 16:00 on 4/23/03. N4672200 E538224. Along river. Game Country Camera Unit 15. (Moved from Station 3 a few hours earlier.) N4672200 E0538227. Took 3 test pictures - one at site with flash. LED at 12 when site was left. Mackerel bait. Put 2 new AA alkaline batteries in camera (Powerex did not seem to work). No lock. Took 1 picture of site. Closed at 09:42 on 5/20/03. Took test picture - nothing happened. LED read 12. Subsequently determined that C-batteries were dead.

### FOUS Camera Stations

01. On 4/13/04 set on game trail west of Fort between parking lot and river, pointing straight down from horizontal branch. Time about 4:00pm CT. Stealth camera #16. 01 and 01 on delay and repeat settings. Elite Chrome 400sp 36exp. UTM E0571277 N5316680. New Rayovac batteries. Rickard coon lure. Took 2 test pictures. Pulled at 16:55 on 5/24/04. LED read 99. Film rewind.
02. On 4/13/04 around 4:30pm CT. Game trail through riparian area west of picnic table near westernmost parking lot. Stealth #18. New Rayovac batteries. Mackerel bait. UTM 5316731 0571150. Elite 400sp 36exp. 01 and 01 on settings. Took 1 test picture. Pulled at 17:00 on 5/24/04. LED read 99. Film rewind.
03. On 4/13/04 around 5:00pm MT. Game trail in riparian area. Digital #04. UTM 5316770 0571103. New Rayovac batteries. Locked. 32mb card. Pulled at 17:05 on 5/24/04. Green LED flickered when I put in bag. No pictures on card, probably a malfunction.
04. Set on 4/13/04. N5316973 E570880. On horizontal branch pointing down. Mackerel set near west boundary. New Rayovac batteries. Elite 36exp 400sp. Stealth #17. 01 and 01 for delay and repeat. Set at 5:53pm CT. Pulled at 17:10 on 5/24/04. Battery was dead. Film was exposed accidentally. Appeared to be only a few pictures. No pictures developed.
05. On 4/13/04. Just west of maintenance shop. Game Country #10. Mackerel bait. UTM 5316461 0572063. New Rayovac batteries in camera and sensor. At 6:29pm CT. 2 test pictures. Pulled at 16:50 on 5/24/04. LED read 0. Film rewind.

### JECA Camera Stations

1. Southwest corner of sewage pond. N4842230 E0593845. Stealth camera unit 07. Set on 5/21/03 at 11:00. 278 degrees. 1 minute between pictures. 36exp Elite 400sp film. Used batteries. Fish lure. Took test picture. Pulled at 10:30 on 6/4/2003. LED read 39 and low battery light blinking. Film may have been ruined because camera did not auto rewind.
2. Cave entrance under shrub. Digital Unit 03 with 32mb card. N4842967 E0593140 + 16m. Temp set to cold. Used batteries. Set at 12:06 on 5/21/03. No lure. Pulled at 09:15 on 6/4/2003. Camera had been moved about 1 ft from original spot and was pointing away from cave.
3. In Hell Canyon. N4843262 E0592882 +6m. Game Country Jr. Unit 11. LED at 1. Set at 12:48 on 5/21/03. Elite 36exp 400sp. Fish and fox lure. Took 1 test picture. Pulled at 10:00 on 6/4/2003. LED read 6. Camera battery light blinking. Took test picture.
4. At Hell Canyon culvert. Digital Unit 04. Chained to tree. N4843335 E0592906 +6m. Set at 1:25pm on 5/21/2003. 32mb card. Temp at normal. Used Energizer batteries. Fish lure. Pulled at 10:00 on 6/4/2003. Took test picture.
5. Lithograph Trail viewing trail. Digital unit 05. Chained to tree. Energizer batteries. N4842701 E0594999 +16m. 325 degrees. Set at 2:40pm on 5/21/03. Temp at normal. Put fish lure on trail. Pulled at 11:04 on 6/4/2003. Took test picture.

### KNRI Camera Stations

01. Set on 4/14/04. Digital camera #01. Locked. Game trail. Fish oil. UTM 5248350 0319996. 32mb card New Rayovac batteries. Set at 11:35am MT. Removed at mid morning on 5/27/04. No pictures on card. Probably malfunction.

02. Set on 4/14/04. Unit 05. Digital camera on vehicle trail. Locked. New Energizer batteries. 32mb card. UTM 5248757 0320001. Mackerel juice. Removed at mid morning on 5/27/04. No pictures on card. Probably malfunction.

03. Set on 4/14/04. Game Country camera (probably #11). Mackerel bait. Set by bench turn around overlooking river. Elite 36exp 100sp. UTM 5249980 0319707. New Rayovac batteries in camera and sensor. Removed at mid morning on 5/27/04. LED at 0 and film rewound.

04. Set on 4/14/04. Stealth camera #08. Mackerel. Tree by mowed vehicle trail. 36exp 100sp. Set at 2:43pm. UTM 5245104 0320681. New Rayovac batteries. Removed at mid morning on 5/27/04. LED read 99 and film rewound.

05. Set on 4/14/04. On mowed vehicle trail leading to Knife River. Digital #03. Locked. Set at 3:52pm MT. Mackerel bait. UTM 5247313 0320152. 32mb card. New batteries. Removed at 8:00am on 5/27/04.

### MORU Camera Stations

1. On old hiking trail north of well near north boundary. E = 0624362 N = 4860444 bearing is 270. Set at 9:20 am on 8/23/02. Digital 16 mb card. Everactive alkaline batteries. Attached to 12 in dbh pine. On 9/5/02 at 1:33 pm replaced 32 mb card with 16 mb card. No other changes. On 9/10/02 at 12:44 pm replaced card with 32 mb card and put fish lure on trail. I (Possibly on 9/20/02 although not sure of date - check images) put new Powerex batteries and a 16 mb card in. Added fox lure. Closed set at 9:15 am on 10/4/02. Set in Sept/Oct 2003 (check camera for date and time). Digital camera. Placed Mackerel under log along trail. Walked by at 3:00pm on 10/24 and at 3:35pm - baited with Mackerel on second pass, did not check or update camera but seemed ok.

2. 20 yards off trail camera #1 is on. E = 0623942 N = 4860515 +- 12m. Used fish lure. Bearing is 349. 35mm 200 speed film 36 exp attached to 6 in fallen aspen. Set at 10:10 am on 8/23/02. Took 2 pictures of site with Kodak 3900. On 9/5/02 at 1:44 pm LED counter read 97. Put in roll of 36 exp 200 sp. Baited with peanut butter. On 9/10/02 at 12:29 am visited station. LED counter read 39. Low battery LED blinking. Moved camera to new station #8. Set in Sept/Oct 2003 (check camera and other units for exact date and time). Game Country Unit 10. Put out Mackerel bait. Checked on 10/24/2003. Camera LED at 1. Sensor working. Clock on camera not working. Assumed camera not working and removed from field.

3. In beaver pond in Starling Basin. E0623711 N4858456 +-12m - location is scent station - camera pointing 18 degrees - 15 ft from scent - used fish oil on log - set on 8/25/02 at 9:24 am - attached to spruce. Accidentally forgot to put film in camera (thought I put in 200 sp 36 exp). At 6:47 pm on 8/27/02 camera had 13 hits at time film put in. On 9/5/02 at 9:02 am the low battery red light was blinking. Put in 4 Powerex NiMH batteries. LED counter on camera read 94 events. Film was all used up. Put in roll of 36 exp 200 sp. Used peanut butter as bait. Took 3 test pictures - note camera low power light was on but seemed to be working ok. On 9/10/02 LED readout at 64 pictures. Put in 36 ex 200 sp film and new Powerex batteries. Moved about 5m to the north (but considered same station). Now attached to deadfall by waters edge and facing away from Blackberry Trail. Used fish lure on cotton swab. On 9/20/02 at 9:03 am retrieved camera and closed station. Camera was 1/3 underwater and LED display off. Subsequent tests of camera have found it not working.

4. Along Blackberry Trail. Digital camera. E0623871 N4858764. +-11m. No scent. Everactive batteries. Set at 8/25/02 at 10:08 am. Attached to small pine next to big pine. Used 16 mb card. Normal temp setting. Set at 309 degrees. Took picture of station with Kodak 3900. At 7:04 pm on 8/27/02 replaced card with 32 mb card. On 9/10/02 at late morning replaced card. On 9/20/02 at 8:47 am replaced card. Slightly aimed camera down more. Much flagging in area since last visit indicating lots of human presence. On 9/20/02 at 10:20 am on same day closed station. Moved camera to station #7.

5. At culvert on east boundary. Film Stealth camera. UTM of scent station. E0624899 N4859200 +-20m. Set at 12:09 pm on 8/25/02. Used fish oil. Camera on birch pointing 316 degrees 8m from station. 200 sp at

36 exp. Took picture of station with Kodak 3900. Sensor set at "Near". On 9/5/02 at 12:53 pm LED read 27 pictures. Used peanut butter bait - no other changes made. On 9/10/02 at 8:43 am LED counter read 38. Replace film with 36 exp 200 sp. Low battery LED flashing. Put in new Energizer NiMH batteries (however I had not charged them) but LED kept blinking. Moved camera to large pine 4m away at 318 degrees from original tree (considered same station). Camera now facing 45 degrees and still focused on culvert (now about 6 ft from culvert). New UTM is E0624909 N4859208 +- 12m. On 9/20/02 at 7:35 am checked camera - LED at 20 pictures. Took 2 pictures of me adding Rickards coon food lure. Low battery LED was NOT blinking. Closed on 10/04/02 at 9:55 am. LED read 59 events. Battery appeared good.

6. At trail crossing by park well facility. E0624383 N4860059 +-8m. Set at 1:09 pm on 8/25/02. Digital camera with used Panasonic batteries (used about 10 days). 16 mb card. UTM coordinates of camera location. Used fish lure. Took pictures of station with Kodak 3900. Attached to pine by fence post. On 9/5/02 at 1:20 pm I put in new Powerex batteries since the existing appeared dead. Replaced 32 mb card with 16 mb card. Put out peanut butter. On 9/10/02 at 12:57 pm put in 16 mb card and fish lure. Put Rickards fox lure out on 9/20/02 at 11:33 am. No other changes. Closed set at 9:25 am on 10/4/02. Set digital camera at 3:55pm on 1/3/03. 32mb card. Powerex batteries. Fox lure. Checked on 1/27/03 at 4:15pm. Put in charged Powerex batteries. Put out bacon grease. Left card in. Put in Powerex batteries and 32mb card on 2/19/03 at 4:30. Put out bacon grease. Took test pictures before and after. (Gap in data record - unclear when unit was removed from field - check images for clues.) Set on Sept/Oct 2003 (check images and other units for exact date and time). Put out Mackerel bait. Digital station by well. Checked at 2:55pm on 10/24. Put out more Mackerel bait. No other changes. Took test picture. Pulled unit at 11:45am on 11/05/03. Everything seemed in working order. Lots of snow on ground.

7. Moved #4 down Blackberry Trail to E0623769 N4858690. Connected to small birch tree pointing at trail at 303 degrees. Set at 12:24 pm on 8/30/02. On 9/5/02 at 8:32 am I replaced 16 mb card with 32 mb card - no other changes.

8. Along creek to Lafferty Gulch (camera came from station #2). 200 sp 36 exp. Fish lure. Powerex batteries. Attached to aspen leaning over creek. Set at 1:25 pm on 9/10/02. Test triggered flash. Unable to get GPS signal. On 9/20/02 at 1:20 pm LED read 33. Put in 36 exp 100 sp film. Added coon lure. Closed at 9:30 am on 10/04/02. Low battery blinking and no LED display. Film was accidentally ruined by camera not automatically rewinding due to dead battery. On 11/18/02 at 4:11pm put out Game Country unit with used Everlast batteries and unfinished roll of film from SCBL (LED read 26 when camera put out). Set for 12 minute delay between pictures. UTM of site is 0624653 and 4860068 +- 11m. Used fish lure. Took 2 pictures of site with Nikon 4500. Took test picture. On 11/25/02 at 13:00 brought into office. LED read 31. Took one accidental picture. On 12/11/02 at 16:15 put out Game Country with used roll from SCBL (LED read 26) with charged Powerex batteries. Used Mackerel for bait. Retrieved on 12/18/02 at 7:15am. LED read 31. The Powerex batteries appeared dead. Mackerel was gone. Set at 4:00pm on 12/18/02. New Powerex batteries. LED read 32. Put more mackerel out. Retrieved at 11:30 on 12/24/02, LED still at 32. Batteries appeared dead. Set digital camera at 3:50pm on 1/3/03. Used used blue alkaline batteries. Mackerel for bait. Checked on 1/27/03 at 4:00pm. Put in charged Powerex batteries and put out bacon grease. Left card in. Checked on 2/19/03 at 4:20pm. Put out bacon grease. Put in charged Powerex. Put in 16mb card. Took test pictures before and after change. (Gap in record as to when unit was removed.) Set in Sept/Oct 2003 (check other units for exact time and date). Game Country unit. Put out Mackerel bait. On 10/24/2003 at 2:46pm found the film rewound. Bait all gone. Put in new roll Elite 400sp 36exp. Put out Mackerel bait. Kept same batteries in. Pulled at 11:45am on 11/05/03. Snow on ground. No tracks in image area.

9. Digital camera from blackberry trail (set #7). Set at 10:30 am on 9/20/02. Used Rickards coon lure. E0623912 N4858848 +- 7m. Bearing 155 degrees. Station along game trail. Near large squirrel midden. Closed at 10:30 am on 10/04/02.

10. Dummy station for site at beaver pond that was submerged (i.e. camera moved from station 3). UTM 623703 4858451.

## SCBL Camera Stations

1. At large culvert under train track. Stealth film camera. 36xp 400sp. Powerex batteries (4 C-size). E0607909 N4634173 zone13 +6m. No bait. Tied to maple tree. 1 minute delay between pictures (all Stealth cameras have been set at that). Bob Manasek took 2 digital pictures of station. Took test picture. Set at 12:10 on 10/09/02. Closed at 11:38 on 11/4/02. No display on LED. Batteries appeared to be dead.
2. Tied to wooden fencepost by train track at game crossing between fence and butte. Game Country with 36exp 400sp and Powerex. E0607994 N4634148 +6m. No bait. Set at 12:30 on 10/09/02. Bearing at 105 degrees. B. Manasek took 1 digital picture of station. Closed at 11:33am on 11/4/02. Camera LED read 92 but flickering as if battery low.
3. Big cottonwood by rock dam at west end of island. E0607461 N4634535 + 6m. Game Country 36exp 400sp. Fish lure. Set at 1:31pm on 10/09/02. B. Manasek took photo of set. Closed at 12:08 on 11/4/02. LED on camera flickering - unable to read display.
4. On island. Ash by river along game trail paralleling river. E0608693 N4634120 +8m. Digital camera. Powerex batteries. 32mb. Fox lure at dirt hole under wood. Set at about 1:50pm on 10/09/02. B. Manasek took photo of set. Closed at 12:15 on 11/04/02. Attempted to take test picture. Set at 3:43pm on 3/20/03 with digital Camera Unit 05 and new Energizer alkaline D batteries. Delay set for 1 minute. 32 mb card. Temp setting normal. Clock set to month-day-year. Fish lure. Pulled at 1014 on 4/24/03. Took test picture. No pictures on card - appears to have been a technical malfunction.
5. On island. Box elder by river bank. Stealth 36exp 400sp. 8 Energizer AA batteries were used. E0608762 N4634123 +7m. Fish lure on river bank. Took test photo. B. Manasek took photo of set. Closed at 12:20 on 11/4/02. LED read 56 and batteries seemed ok.
6. Small box elder across canal over metal walk bridge/control structure. Game Country 36exp 400sp. Powerex batteries. 3 minute delay between exposures (all Game Country cameras were set that way). E0608830 N4634033 +5m. Rickards coon lure at dirt hole set. Set at 14:45 on 10/09/02. Bearing 48 degrees. B. Manasek took photo of set. Closed at 11:00am on 10/11/02 (same time number 8 was set up). Camera moved to station 9. No other changes made to camera.
7. Just SW of east entrance in draw. Chained to small shrub. E0608158 N4630954 +20m. Digital camera 32mb. Powerex battery. Fox lure at dirt hole. Set at 10:05 on 10/11/02. Closed at 12:51 on 11/4/02. Lots of tracks on trail. Took test picture. Set at 2:58pm on 3/20/03 with digital Camera Unit 02 and new Energizer alkaline D batteries. Delay set for 1 minute. 32 mb card. Temp setting normal. Clock set to month-day-year. Used fox lure. Pulled at 0932 on 4/24/03. Took test picture first.
8. Chained to same tree as set 6. E0608831 N4634035 +5m. Digital camera 32mb. Powerex batteries. Bearing 150 degrees. On game trail. Fish lure. Set at 10:50 on 10/11/02. Closed at 12:25 on 11/4/02. Angle appeared to have shifted slightly. Set on 3/20/03 around 1600 with Camera Unit 06 and new Energizer D batteries. Delay set for 1 minute. 32 mb card. Temp setting normal. Clock set to month-day-year. Pulled on 4/24/03 at 1029. Took test pictures.
9. Tied to wood post (no lock) at south end of metal walkway near station 8. View of canal mud flat. Game Country Camera Unit 13. Same settings/film as station 6. E0608836 N4634046 +6m. Bearing 262 degrees. Coon lure and fish oil. Set at 11:20 on 10/11/02. Camera gone on 11/4/02. Found on same day on other side of canal up on road - obviously moved there by people. Water inside unit. Set Game Country on 3/20/03 at 4:14pm (unit ID not recorded - either 10 or 14). Energizer C batteries for sensor, Powerex NiMH AA for camera. Fish lure. No lock. Attached to fence post. Pulled at 1022 on 4/24/03. LED read 1.
10. By canal by beaver area. Fish lure. Locked to tree. Digital Camera Unit 01 with new Energizer D batteries. Delay set for 1 minute. 32 mb card. Temp setting normal. Clock set to month-day-year. Set around 1600 on 3/20/03. Pulled on 4/24/03 at 1035. Took test pictures. Moisture in unit.